



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/792,330	03/02/2004	Hung-Chin Guthrie	HIT1P075/HSJ920040008US1	4407
50535	7590	02/24/2006	EXAMINER	
ZILKA-KOTAB, PC			STARK, JARRETT J	
P.O. BOX 721120			ART UNIT	
SAN JOSE, CA 95172-1120			PAPER NUMBER	
			2823	

DATE MAILED: 02/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/792,330

Applicant(s)

GUTHRIE ET AL.

Examiner

Jarrett J. Stark

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 03/02/2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 12-21 is/are rejected.
- 7) ☒ Claim(s) 11 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3/2/2004

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Objections

The term "sufficient" in claims 1,9,17,18 is a relative term which renders the claim indefinite. The term "sufficient" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

Claims 12 –21 are misnumbered. There appears to be no claim 11.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 19 is rejected under 35 U.S.C. 102(b) as being anticipated by Iijima et al.

(US 6,330,743).

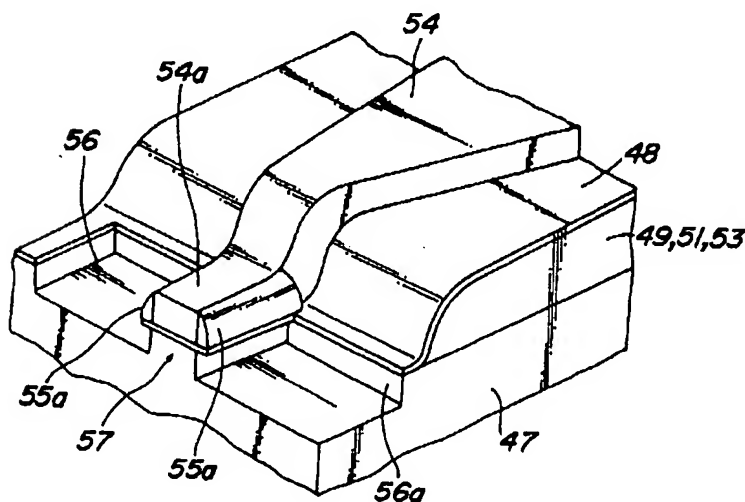
Regarding claim 19, Iijima et al discloses in Fig. 29 a structure formed on a magnetic write head, comprising:

a magnetic structure having an upper surface and having first and second lateral sides and having a width measured between said lateral sides and having a height measured perpendicular thereto;

a dielectric layer contacting said first and second lateral sides of said magnetic structure and extending laterally therefrom and having an upper surface; and
wherein

said upper surface of said dielectric layer is recessed from said upper surface of said magnetic structure and said upper surface of said dielectric layer.

FIG. 29



Applicant's admitted prior art Figures 1A&B also disclose the structure of claim 20.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 1 rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art in view of Iijima et al. (US 6,330,743).

Regarding claim1, the Applicants admitted prior art (paragraphs [0008-0011] and Figs 1A-B) in view of Iijima et al teach a method for manufacturing a magnetic structure on a magnetic write head, comprising:

- constructing a photoresist layer having a trench; (applicant's admitted prior art)
- depositing a magnetic material into the trench; (applicant's admitted prior art)
- removing the photoresist layer; (applicant's admitted prior art)
- depositing a dielectric material; (applicant's admitted prior art)

performing a chemical mechanical polish to remove a portion of said dielectric material; (applicant's admitted prior art)

The applicant's prior art does not teach the step of performing a reactive ion mill procedure to remove a sufficient amount of dielectric material to expose said magnetic material.

Iijima et al teaches the method of performing a reactive ion mill procedure to remove a sufficient amount of dielectric material to expose said magnetic material.

(Iijima, Col. 11 lines 40-43)

Therefore it would be obvious to one of ordinary skill in the art at the time of the invention perform a reactive ion etch to expose the magnetic material.

portion of the first magnetic layer exposed in the recess is etched such that the recess is dug down over into the first magnetic layer over a part of a whole thickness of the first magnetic layer, and said etching is performed by an ion beam etching such as ion milling.

Regarding claim 2, the Applicants admitted prior art in view of Iijima et al teach a method as in claim 1 further comprising forming a magnetic pole structure over the exposed magnetic material. (Applicant's admitted prior art [0003])

Regarding claim3, the Applicants admitted prior art in view of Iijima et al teach a method as in claim 1 wherein said constructing a photoresist trench further comprises:
depositing photoresist; and
performing a deep ultraviolet photolithography on the photoresist.

(Applicants admitted prior art paragraphs [0008-0011] and Figs 1A-B)

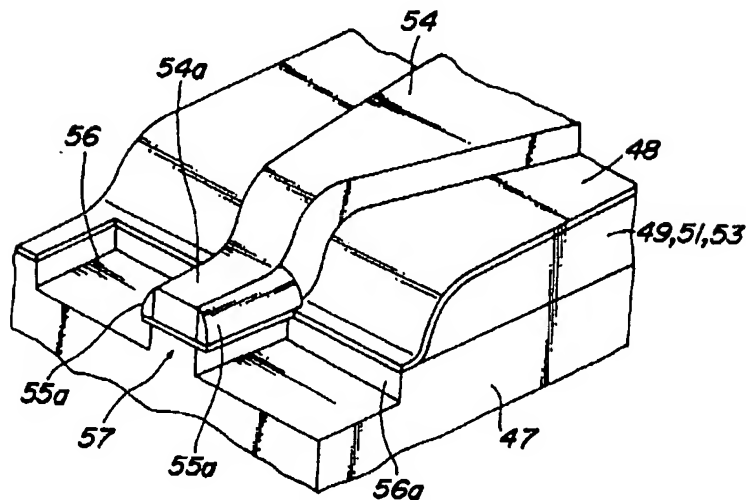
Regarding claim 4, the Applicants admitted prior art in view of Iijima et al teach a method as in claim 1, wherein said depositing said magnetic material comprises electroplating. (Applicants admitted prior art paragraph [0003])

Regarding claim 7, the Applicants admitted prior art in view of Iijima et al teach a method as in claim 1, wherein said magnetic material comprises NiFe. (Applicants admitted prior art paragraph [0004])

Regarding claim 8, the Applicants admitted prior art in view of Iijima et al teach a method as in claim 2, wherein said magnetic pole structure comprises NiFe. (Applicants admitted prior art paragraph [0004])

Regarding claims 9,17,18, 20, & 21 the Applicants admitted prior art in view of Iijima et al teach a method as in claim 1 (regarding claims 20 & 21- the structure of claim 19), wherein said reactive ion milling procedure is performed sufficiently to form a recession of between 0 and 0.3 microns between said magnetic structure and an upper surface of said alumina. Iijima teaches using ion etching to form the recession (56) in Fig 29.

FIG. 29



It would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal value for the depth of the recession through routine experimentation and optimization to obtain optimal or desired device performance because the depth of the recession is a result-effective variable and there is no evidence indicating that it is critical or produces any unexpected results and it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05

Given the teaching of the references, it would have been obvious to determine the optimum thickness, temperature as well as condition of delivery of the layers involved. See *In re Aller, Lacey and Hall* (10 USPQ 233-237) "It is not inventive to discover optimum or workable ranges by routine experimentation." Note that the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 f.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Any differences in the claimed invention and the prior art may be expected to result in some differences in properties. The issue is whether the properties differ to such an extent that the difference is really unexpected. In re Merck & Co., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Appellants have the burden of explaining the data in any declaration they proffer as evidence of non-obviousness. Ex parte Ishizaka, 24 USPQ2d 1621, 1624 (Bd. Pat. App. & Inter. 1992).

An Affidavit or declaration under 37 CFR 1.132 must compare the claimed subject matter with the closest prior art to be effective to rebut a prima facie case of obviousness. In re Burckel, 592 F.2d 1175, 201 USPQ 67 (CCPA 1979).

Regarding claims 10 & 12, the Applicants admitted prior art in view of Iijima et al teach a method as in claim 1 wherein said magnetic structure has a width sigma of less than 10 nanometers.

Iijima teaches in Col. 1 lines 50-56, the "performance of a recording head has been also required to be improved. In order to increase a surface recording density, it is necessary to make a track density on a magnetic record medium as high as possible. For this purpose, a width of a pole portion at the air bearing surface has to be reduced to a value within a range from several micron meters to several sub-micron meters."

Therefore it would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal value for the width of the

Art Unit: 2823

magnetic structure through routine experimentation and optimization to obtain optimal or desired device performance because the width of the magnetic structure is a result-effective variable and there is no evidence indicating that it is critical or produces any unexpected results and it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05

Regarding claim 13, the Applicants admitted prior art in view of Iijima et al teach a method as in claim 1 wherein said dielectric material is alumina (Al_2O_3). (Applicants admitted prior art paragraph [0005] & Iijima, Col. 2, line 11)

Regarding claim 14, the Applicants admitted prior art in view of Iijima et al teach a method as in claim 1 wherein said magnetic structure is a P3 pedestal of a magnetic pole. (Iijima, Fig. 29 (54))

Regarding claim 16, the Applicants admitted prior art in view of Iijima et al teach a method as in claim 1 wherein said reactive ion mill is performed sufficiently to create a recess between an upper surface of said magnetic structure and an upper surface of said dielectric material. (Iijima, Fig. 29)

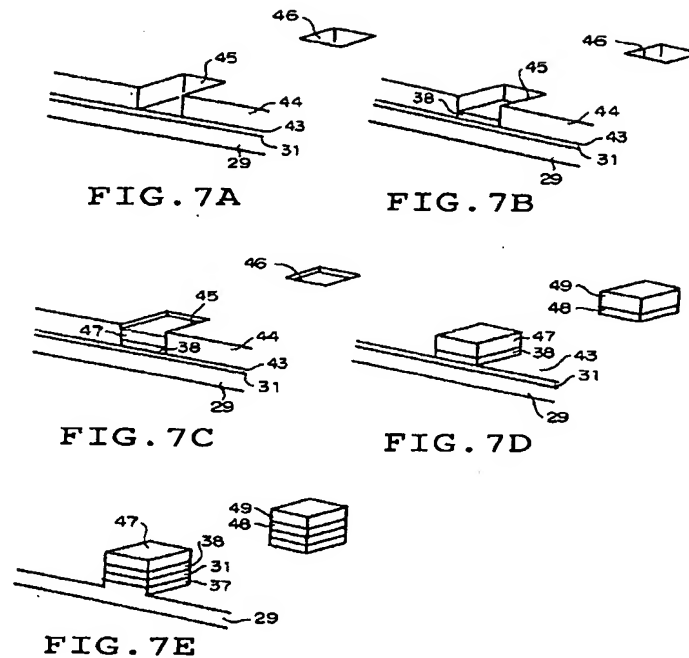
Claim 5 rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art in view of Iijima et al. (US 6,330,743) in further view of Otsuku, (US 2001/0005297).

Regarding claim 5, the Applicants admitted prior art in view of Iijima et al teach a method as in claim 1, wherein said depositing said magnetic material comprises electroplating said magnetic material.

The combined references fail to disclose the method of terminating said electroplating before said magnetic material reaches an upper opening in said trench formed in said photoresist layer.

Otsuka teaches and shows in Figures & 7A-C the method of stopping the electroplating before the magnetic reaches the upper opening of the trench. (Otsuka, [0038-39])

Therefore it would be obvious to one of ordinary skill in the art at the time of the invention to stop the electroplating before the magnetic reaches the upper opening of the trench.



In this manner, the upper magnetic pole piece 38 is formed within the void 45. The thickness of the deposited magnetic layer is set larger than 0.5 μm , for example, so as to suppress or totally prevent a magnetic blur in a resulting thin film magnetic head element 26. (Otsuka, [0038])

Regarding claim 6, the Applicants admitted prior art in view of Iijima et al in further view of Otsuka teach a method as in claim 1, wherein said trench includes a flared portion (Applicant's prior art, [009], fig 1, (106)), and wherein said depositing said magnetic material comprises electroplating said magnetic material, and terminating said electroplating before said magnetic material reaches said flared portion formed in said trench. (Otsuka, Figures & 7A-C)

Regarding claim 6, the Applicants admitted prior art in view of Iijima et al in further view of Otsuka teach a method as in claim 1 wherein said reactive ion mill is performed in an atmosphere comprising CHF₃. (Otsuka, paragraph [0046])

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jarrett J. Stark whose telephone number is (571) 272-6005. The examiner can normally be reached on Monday - Thursday 7:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JJS
February 13, 2006



**W. DAVID COLEMAN
PRIMARY EXAMINER**